SECTION 03600

GROUT

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
   1. Grout where shown on Drawings or as specified.

B. Related Sections
   1. Cast-In-Place Concrete - Section 03300.
   2. Structural Steel - Division 5.
   3. Mechanical Equipment - Division 15.
   4. Electrical Equipment - Division 16.

1.2 REFERENCES

A. ASTM C 109 Test Method for Compressive Strength of Hydraulic Cement Mortars.

B. ASTM C-307 Test Method for Tensile Strength of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.

C. ASTM C 476 Standard Specification for Grout for Reinforced and Non-reinforced Masonry.

D. ASTM C-579 Test Methods for Compressive Strength of Chemical Resistant Mortars and Monolithic Surfacings.

E. ASTM C-580 Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, and Monolithic Surfacings.

F. ASTM C 939 Test Method for Flow of Grout for Preplaced-Aggregate Concrete.

G. ASTM C 1107 Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink).

H. CRD C-621 Corps of Engineers specification for Non-Shrink Grout.

1.3 SYSTEM DESCRIPTION

A. Arrange for grout manufacturer to provide authorized representative on site to monitor the production and placement of grout. Grout manufacturer shall certify the procedures, quality and installation of grout.

B. Defective material or improper workmanship at project site may be rejected regardless of previous inspections.

C. Remove rejected material, including associated work, and provide new materials and work that conform to Contract Documents.

D. Alternatively, repair rejected material or work. Submit written request as specified under Article Submittals, but do not proceed until Registered Design Professional approves repair and methods. If Registered Design Professional does not approve repair request, remove rejected material, and provide new materials including associated work.

E. Provide removal and replacement, or repair, at no additional cost to Owner, and pay costs because of delay caused by rejection and corrective action.

F. Provide and maintain temporary protection to prevent damage to adjacent surfaces when installing grout.

G. Provide and maintain temporary protection to prevent damage to grout during installation and curing. Leave protection in place until ensuing operations are completed.

1.4 SUBMITTALS

A. Furnish submittals for items that are identified in this Section by different typefaces and bracketed codes (e.g. *Item [L]*). Refer to Section 01340 for definition of codes, submittal types, and administrative requirements governing submittal procedure.

B. Additional submittal requirements about this Section are specified under this Article.

1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver packaged materials to project site in their original unopened containers, packages, and bundles, bearing labels that identify manufacturer's name, brand name, type, and grade.

B. Properly store and handle material. Replace damaged or unsuitable material with new material before installation at no additional cost to Owner.

C. Grout stored beyond manufacturer's recommended shelf life shall not be used.

1.6 PROJECT CONDITIONS

A. Verify location and bearing elevations or setting surfaces before proceeding with installation. Perform the verification in time to permit necessary corrections without delaying project.

PART 2 PRODUCTS

2.1 MATERIALS

A. Non-Shrink Grout
   1. Premixed, non-shrink, non-metallic grout consists of aggregate base, portland cement and sand, and with necessary plasticizers, densifiers and other control ingredients.
   2. Non-Shrink grout shall conform to CRD - 621 requirements.
   3. Non-Shrink grout shall conform to ASTM C 1107, Grade B (or Grade C).
   4. Non-Shrink grout manufacturers:
      a. Dayton Superior "Sure-Grip High Performance Grout"
      b. Euclid Chemical Company, Inc. "Hi-Flow Grout"
      c. Master Builders, Inc. "Set Grout"
      d. Sika Corporation "Sika Grout 212"
      e. Five Star Products, Inc. "Five Star Grout"

B. Epoxy Grout
   1. Premixed Epoxy Grout consists of thermosetting resin base, with inert fillers suitable for use on dry or damp surfaces.
   2. Epoxy Grouts shall meet minimum characteristics as follows:
      a. Working Time At
         50 degF 2.0 Hours
         70 degF 1.5 Hours
         90 degF 1.0 Hours
      b. Compressive Strength per ASTM C 579 At
         73 degF 14,000 psi at 28 Days
         170 degF 10,000 psi at 28 Days
      c. Tensile Strength 2,200 psi per ASTM C-307.
      d. Flexural Modulus of Elasticity per ASTM C 580.
         73 degF 2,1000,000 psi
         140 degF 1,700,000 psi
         170 degF 800,000 psi
      e. Creep Resistance at 600 psi, 140 degF, maximum = 4,000 in/in.
   3. Epoxy grout manufacturers:
      a. Dayton Superior "Sure-Grip Epoxy Grout (J54)"
      b. Euclid Chemical Company, Inc. "E^3-Series, E^3-F, E^3-G, E^3-H"
      c. Master Builders, Inc. "Ceilcote 648 CP Plus"
      d. Sika "Sikadur 42, Grout Pak"
      e. Five Star Products, Inc. "Five Star Epoxy Grout"

C. Utility Grout and Dry Pack Grout
   1. Utility Grout: mixture of fine, natural sand aggregate and portland cement, mixed with minimum amounts of water per ASTM C 476.
   2. Dry Pack Grout: premixed, non-shrink, non-metallic, dry grout consisting of aggregate base, portland cement, and sand, with necessary plasticizers, densifiers and other control ingredients.

3. Utility Grout and Dry Pack Grout shall conform to CRD-C 621 Specifications for non-shrink grouts.
4. Utility Grouts and Dry Pack Grouts shall have minimum compressive strength of 5,000 pounds per square inch at 28 days.
5. Utility grout manufacturers:
    a. Dayton Superior “Sure-Grip Utility Grout”
    b. Euclid Chemical Company, Inc. “N-S Grout”
    c. Master Builders, Inc. “Construction Grout”
    d. U.S. Grout Corporation “NBEC“
    e. W.R. Meadows, Inc. “588 Grout”
6. Dry Pack grout manufacturers:
    a. Dayton Superior “Sure-Grip Grout Dri-Pak”
    b. Euclid Chemical Company, Inc. “Dry Pack Grout”
    c. W.R. Meadows, Inc. “Pac-It Grout”

D. Fluid Non-Shrink Grout with Extended Working time
1. Fluid nonshrink grout cement based grout with extended working time shall be Grade B (Post Hardening Volume Controlled) or Grade C (Combination Volume Controlled).
2. Fluid nonshrink grout shall conform to ASTM C 1107, when tested at fluid consistency of 25 to 30 seconds per ASTM C 939 at temperature extremes of 45 and 90 degF and with extended working time of 30 minutes at temperature extremes of 45 and 90 degF.
3. Fluid nonshrink grout shall have minimum strengths of 6500 psi at 3 days when mixed at fluid consistency.
4. Fluid Grout with Extended Working Time Manufacturers:
    a. U.S. Grout Corporation “Five Star 110”
    b. Master Builders, Inc. “Masterflow 928”

PART 3 EXECUTION

3.1 SURFACE PREPARATION

A. Ensure that contact surfaces are free of dust, dirt, standing water, oil, grease, laitance, and other contaminants that would be detrimental to proper installation and performance of specified grout.

B. For cement based grouts, thoroughly wet concrete contact surfaces for 24 hours before grouting. Remove standing water before placing grout.

C. Apply epoxy grouts to dry contact surface.

D. Maintain contact surface temperature between 50 and 80 degF. For hot and cold weather application, carry out work in agreement with grout manufacturer’s recommended procedures.

3.2 INSTALLATION

A. Perform all work under supervision of Manufacturer’s authorized representative.

B. Mix specified grout according to manufacturer's recommended procedure. Place grout within roughly 30 minutes of mixing.

C. Install specified grout to prepared surface per manufacturer's printed instructions.

D. Cure grout in agreement with manufacturer's recommended procedure.

E. Place Non-Shrink grout between concrete and column base plates unless otherwise noted on Drawings or specified.

END OF SECTION

Revision History	
Date	**Rev. No.**
A	0
B	0
C	0
D	0
E	0
F	0
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